

ICS 43.060.01
CCS T 11



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 18297-2024

Replacing GB/T 18297-2001

Performance test code for road vehicle engines

汽车发动机性能试验方法

Issued on: May 28, 2024

Implemented on: December 1, 2024

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

Foreword...	3
1 Scope...	6
2 Normative references...	6
3 Terms and definitions...	6
4 Requirements for measurement error and measurement location...	8
5 Calculation of test data...	10
6 Control of general test conditions...	14
7 Engine accessories during the test...	15
8 Test methods for twelve performances...	17

1 Scope

GB/T 18297-2024 is the Chinese performance test code for road vehicle engines. Every figure quoted for an engine, the rated power, the maximum torque and the speeds at which they occur, the fuel consumption map, the mechanical efficiency, comes from a bench test, and the numbers are only comparable if the test conditions are fixed: the accessories fitted or removed, the fuel and lubricant, the intake and exhaust arrangement, the coolant and oil temperatures, the correction for atmospheric conditions, and the way the measurement point is approached and stabilised. This standard fixes them. It sets the test conditions and the requirements on the test bed and the instrumentation and their accuracy, the preparation and the running-in of the engine, the measurement of the full-load and part-load characteristics, the fuel and oil consumption, the mechanical losses, the speed regulation, the starting behaviour and the thermal balance, together with the correction factors, the calculation and expression of the results and the test report. The 2024 edition replaces GB/T 18297-2001. For an engine maker, a vehicle manufacturer or a testing house in China, this is the protocol behind the quoted figures.

This document describes the bench test code for the performance of road vehicle engines, and is used for evaluating the performance of road vehicle engines. This document applies to gasoline and diesel engines for Category M and N motor vehicles. Such engines are reciprocating, rotary type, and not free piston type. For road vehicle engines using other fuel types, the same guidelines apply.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document

and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 1883.1, Reciprocating internal combustion engines - Vocabulary - Part 1. Terms for engine design and operation

GB/T 15089, Classification of power-driven vehicles and trailers

3 Terms and definitions

For the purposes of this document, the terms and definitions given in GB/T 1883.1 and GB/T 15089, as well as the following apply.

3.1 observed brake power The power output of the engine under actual intake conditions¹⁾.

3.2 corrected brake power The power corrected to standard intake conditions from the observed brake power. 1) The power ratings used in this document refer to the power calculated from the measured speed and torque values under different conditions at full load (i.e., throttle at full open), in kilowatts (kW). When the engine is running, the percentage of unburned fuel mixed with the engine oil relative to the total amount of engine oil.

4 Requirements for measurement error and measurement

4.1 Torque The measurement error of torque shall not exceed $\pm 1\%$ of the maximum torque value of the engine being measured.

4.2 Speed The measurement error of speed shall not exceed $\pm 0.5\%$ of the measured value.

4.3 Fuel consumption The measurement error of fuel consumption shall not exceed $\pm 1\%$ of the measured value.

4.4 Temperature Unless otherwise specified, the following requirements shall generally be followed.

a) Coolant temperature. Measured at both the engine coolant outlet and inlet; the error shall not exceed $\pm 2\text{ }^{\circ}\text{C}$.

b) Oil temperature. Measured at the main oil passage, the main oil passage inlet, or a representative location; the error shall not exceed $\pm 2\text{ }^{\circ}\text{C}$.

c) Exhaust temperature. Measured at a distance of 50 mm from the engine exhaust manifold outlet or turbocharger outlet, and located at the center of the exhaust connection pipe; the error shall not exceed $\pm 2.5\text{ }^{\circ}\text{C}$ or $\pm 0.75\%$ of the measured temperature, whichever is greater.

d) Fuel temperature. Diesel temperature shall be measured at the inlet of the fuel injection

pump; gasoline temperature shall be measured near the carburetor, at the inlet of the low-pressure fuel rail, or at the inlet of the high-pressure fuel pump; if this is difficult, the manufacturer's recommended representative location can be used; the error shall not exceed ± 2 °C.

e) Intake air temperature after intercooling. Measured at 50 mm from the intercooler outlet; the error shall not exceed ± 2 °C.

4.5 Pressure Unless otherwise specified, the following requirements shall generally be followed.

a) Intake manifold vacuum and absolute pressure. Vacuum shall be measured approximately 30 mm downstream of the intake manifold inlet, with the pressure gauge flush with the inner wall of the manifold; intake manifold absolute pressure shall be measured at the location specified by the manufacturer; the error shall not exceed $\pm$

0.15 kPa.

b) Intake connection pipe pressure drop. Measured at approximately 150 mm upstream of the engine intake port, with the pressure probe flush with the inner wall of the pipe; the error shall not exceed $\pm$

0.05 kPa.

4.7 Engine intake air status

4.7.1 Intake air temperature Measured within 150 mm upstream of the air inlet along the axis of the engine air inlet (i.e., the air inlet of the intake connection pipe, carburetor, throttle body, or air filter); the sensor shall not be exposed to heat radiation and shall be thermally shielded; the error shall not exceed ± 1 °C.

4.7.2 Intake air pressure The measurement location shall be the same as the intake air temperature measurement location; the error shall not exceed $\pm$

0.1 kPa.

4.7.3 Intake air humidity The measurement location shall be the same as the intake air temperature measurement location; the relative humidity error shall not exceed $\pm 5\%$.

4.8 Engine air consumption The measurement error of air consumption shall not exceed $\pm 3\%$ of the measured value.

4.9 Piston leakage The measurement error of piston leakage shall not exceed $\pm 5\%$ of the measured value.

5 Calculation of test data

5.1 General symbols, names and units The general symbols, names and units are shown in

Table 1.

6 Control of general test conditions

6.1 Unless otherwise specified, performance tests shall generally be conducted in accordance with the requirements of 6.2 ~ 6.11.

6.2 Fuel and engine oil. Use the designations specified by the manufacturer.

6.3 Break-in. Proceed according to the break-in specifications provided by the manufacturer.

6.4 Cooling system temperature. The coolant outlet temperature of the water chiller shall be controlled within $\pm 5^{\circ}\text{C}$ of the temperature specified by the manufacturer. If the manufacturer does not specify otherwise, it shall be controlled within $88^{\circ}\text{C} \pm 5^{\circ}\text{C}$. The temperature tolerance may be reduced if necessary. The temperature of the designated points and heat sinks of the air chiller shall be in accordance with the manufacturer's specifications.

6.5 Engine oil temperature. as specified by the manufacturer; if the manufacturer does not specify otherwise, control it at $95^{\circ}\text{C} \pm 5^{\circ}\text{C}$, and reduce the temperature tolerance if necessary.

6.6 Fuel temperature shall be controlled according to the following requirements.

a) Diesel fuel temperature. Controlled within $\pm 3^{\circ}\text{C}$ of the manufacturer's specified temperature, and the minimum allowable temperature of the fuel pump inlet shall be 30°C ; if the manufacturer does not specify otherwise, control within $40^{\circ}\text{C} \pm 3^{\circ}\text{C}$; the temperature tolerance shall be reduced if necessary.

b) Gasoline temperature. Controlled within $\pm 5^{\circ}\text{C}$ of the manufacturer's specified temperature, and the minimum allowable temperature shall not be lower than the ambient temperature; if the manufacturer does not specify otherwise, control within $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$; the temperature tolerance may be reduced if necessary.

6.7 Intercooled intake temperature. Controlled within $\pm 2^{\circ}\text{C}$ of the temperature specified by the manufacturer; if the manufacturer does not specify otherwise, the intercooled intake temperature at the rated power point shall be controlled at $50^{\circ}\text{C} \pm 2^{\circ}\text{C}$, and the temperature tolerance may be reduced if necessary.

6.8 Exhaust back pressure. The difference from the back pressure specified by the manufacturer shall not exceed $\pm 1\text{ kPa}$.

6.9 Engine blowing. If the engine does not have a fan, all tests may be conducted by setting an external fan or a corresponding device to blow air onto the engine.

6.10 Engine adjustment. No adjustments shall be made during the type approval,